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ORGANIZATIONAL STRUCTURES, PROCESSES, AND PROBLEMS: A LITERATURE REVIEW AND TAXONOMY

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This report provides a limited review of the literature on organizational structure, processes, and associated problems that are amenable to diagnosis and remediation by either leaders or organizational consultants. Within this limited scope, dominant technology impact on structure and process is discussed, and guidelines are provided for the development of a strategy of organizational diagnosis focusing on either structure or organizational process antecedents.

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I. INTRODUCTION

This study has two objectives: (1) to present a review of organizational structures and processes in ways which can be applicable to the Army's OE effort; and (2) to relate these findings to a diagnostic method which Organizational Effectiveness Staff Officers (OESOs) can use to enhance their OE efforts.

The notion of organizational structure in the military poses a large question mark. While private industry innovated in the 1960s and 1970s with a variety of designs, the Army has remained wedded to traditional staff-line hierarchies. This is reflected in the literature. There is a scarcity of references to military organizations as organizational structures. Rather, social and behavioral science literature tends to focus on individual roles, the problems of socialization, and the behavior of the primary group. Indeed, because there is evidence that the behavior of primary groups has a significant impact on military performance (see George, 1971, Aran, 1974), much recent research has concentrated on this aspect without examining how primary groups are aggregated into fuller structures or the processes which keep sets of primary groups intact. Organizational structure is seen as invariant, and characterized largely by the chain of command. However, primary groups do not exist in a vacuum. They have tasks to perform, and they have to coordinate with other groups. In relating to other groups they have to make decisions about how to implement orders. These are the cornerstone variables which make for organizational structure. Organizational processes bind these structures together and make it possible for the structure to exist. While TOE requirements and IG inspection specifications limit the flexibility of commanding officers to change structures, it is still necessary to ask how tasks are really structured and coordinated and what processes exist. The key diagnostic principle we employ is to ask the following questions:

1. Are the organizational processes compatible with the way the organization is currently structured?

2. Is the way the organization is structured compatible with the type of environment it faces?

We believe it is still possible to ask these questions in relatively fixed structures. As we shall point out in Section IV, the major organizational forms can exist in actuality even though the organizational chart specifies one type of structure.

Section II of this study examines the major attributes and shortcomings found in the major schools of organizational

theory. The purpose of this chapter is to detail the range of variables which are examined in an organizational study.

Section III outlines a framework for looking at the context in which organizations operate.

Section IV is the key section outlining structural variables and organizational-process dimensions and the way they link together. Section V discusses how these frameworks can be utilized in an organizational effectiveness effort.

Section V relates the findings of previous sections to the problems encountered by DESOs in the field.

II. MAJOR SCHOOLS IN ORGANIZATION THEORY

As organizations have grown to be a pervasive fact of life in the past century, many theories have been developed to describe and explain their functioning. Many authors have also done extensive reviews and critiques of these theories (Mintzberg, 1979; Bedeian, 1980; Silverman, 1971; Perrow, 1979; Miles, 1980; Khandwala, 1977), and they are primary references for this section.

Among the earliest theoretical works was that of the German social scientist Max Weber (1947), now often called the Bureaucracy School. Weber viewed organizations as mechanistic structures and proposed bureaucracy as an "ideal" organization that would be most efficient in achieving the organization's goals. The properties of a bureaucracy were described to include division of labor, specialization, hierarchy of authority, and coordination through rules and procedures, all designed in an impersonal way to achieve maximum efficiency. Critics of this school charged that the impersonal design of the bureaucracy resulted in many unanticipated consequences that detracted from its intended efficiency (Herzberg, 1968). It was argued that the formality of the structure led to alienation of employees and demotivated workers. This school of thought has been most prominent in thinking about military organizations. Recent studies have focused on the development of the properties of bureaucracy in the military (Deagle, 1973; Faras, 1977; Meiwald, 1970; Palen, 1972; Rycroft, 1975).

The key variables of bureaucracy and their consequences are shown in Table 1.

Table 1

The Anticipated and Unanticipated Consequences of the Bureaucratic Form

BUREAUCRACY	ANTICIPATED CONSEQUENCES	UNANTICIPATED CONSEQUENCES
Hierarchy of authority	→ Efficiency	Alienation of employees
Rules and procedures	Equity	Apathy
Specialization and division of labor		Red tape
Employment of qualified personnel		→ Rigidity
Formal communications		Lack of coordination
Detailed job descriptions		Inefficiency
Impersonality		Work to rules
		Resistance to change

(From Khandwala, P. N. The Design of Organizations. New York: Harcourt Brace Jovanovich, 1977, p. 137.)

The Classical Management School of Fayol and Taylor (and also Urwick, 1948; Brech, 1957; Mooney and Reily, 1939; Gulick, 1937) is distinguished by its emphasis on management processes. Whereas Taylor focused on increasing productivity on the shop floor through the use of time and motion study, Fayol examined management as a whole. He, and others in this school, stressed the need for setting clear management objectives and making detailed specifications of the functions to be carried out. Performance was expected to be optimal by organizing activities into departments, delegating authority, and establishing formal relationships among employees. They also advocated strict upper limits on the executive's span of control (O'Shaughnessy, 1976). This school of thought is similar to the bureaucracy school in that organizations are viewed as impersonal systems in which precision in job definitions, incentives, and responsibilities are best for achieving the organization's objectives. Both these schools stress "rational" structural variables much more than "human" personality and motivation variables, and this has been a major criticism. One other important criticism of this school is about its tendency to state general propositions such as "A manager's span of control should be no greater than six" (Khandwala, 1977). It overlooks the variations that occur in practice (and prove to be effective in different situations) (Dale, 1952), and represents a description of the management process that is overly compartmentalized and simplistic (Mintzberg, 1973). The key attributes of this school are summarized in Table 2.

The Human Relations School of organizational theory received its major impetus from the productivity experiments at the Hawthorne plant of Western Electric in the late 1920s (Roethlisberger and Dickson, 1947). The experimenters found that certain observed increases in productivity could be explained only by group norms and individual motivations rather than objective work conditions. Subsequent researchers focused on several related "behavioral" aspects of organizations. One theorist (Khandwala, 1977) has described the various subsets of the Human Relations School as group dynamics (the structure and functioning of work groups), nonformal organization (the structure of nonformal activities, norms, relationships, and communication patterns), and style of supervision (employee orientation, participative management, autocratic versus democratic leadership). The work groups are viewed as satisfying fundamental individual needs and hence become integral parts of the organization design (Cartwright and Lippitt, 1957; Seashore, 1954; Collins and Guetzkow, 1964; Hare, Borgatta, and Bales, 1966; Likert, 1961). The formal organization chart represents only a part of the overall organization and informal processes play a key role (Walker and Guest, 1952; Dalton, 1959). Finally, supervision and leadership styles are seen as important determinants of employee commitment, motivation, and performance. (Halpin and

Winer, 1957; Katz and Kahn, 1953; Likert, 1961; Fleishman, 1961; Lewin, 1958; Tannenbaum and Kahn, 1957). Some of the key attributes of this school, and its criticisms, are summarized in Table 3.

Table 2

Classical Management School

Key Attributes

- Clear goals and objectives
- Detailed job descriptions to the lowest level
- Hierarchy of sections and departments
- Clear authority delegation
- Limited and prescribed communication channels
- Formal relationships among employees
- Standardized work flow
- Authoritative leadership styles
- Predominantly downward communication flow
- Narrow, predetermined span of control

Criticisms

- Overly rational and simplified role of management
- Slow to adapt
- Propositions too specific. Effective only in limited (stable) situations
- Inadequate consideration of human needs and motivations

Table 3

The Human Relations School

Key Attributes

- High worker morale leads to high productivity.
- Work groups satisfy social needs.
- Effective leadership combines a concern for people with a concern for task effectiveness.
- Participative leadership leads to high morale.
- Human factors in organizations are critical to organizational assessment.

Criticisms

- Social needs and the need for recognition are overemphasized at the expense of the need for security and self-actualization.
- Designed managerial behavior often makes unrealistic assumptions about reality.
- Implication that conflicts can always be resolved to mutual satisfaction is naive.
- Increased research complexity in human relations has been done at the expense of applicability.

To counter the criticism of excessive focus by human-relations theorists on man's social needs, the Human Resources School has stressed the need for self-actualization (McGregor, 1960; Argyris, 1956). McGregor's Theory Y states that all individuals have the potential for being effective performers if the work climate is designed appropriately. Argyris has defined six organizational properties as criteria for differentiating the effective and the ineffective organization (see Table 4). This school also shares some of the criticisms of the human relations school; i.e., an overemphasis on the motivational properties of people and a lack of emphasis on structural factors.

Table 4

Argyris's Organizational Properties, Psychological Health, and Psychological Sickness

Organizational properties contributing to psychological sickness of organizational members	*Organizational properties contributing to psychological health of organizational members*
One part controls the whole (organization)—for example, in a hierarchical organization, the top management controls the rest of the organization	The whole is created and controlled through the *interrelationships* of all parts; the situational logic, not the whims of one part, guides the behavior of the whole
Awareness of plurality of parts but not of their relationship — specialization may cause this	Awareness of *patterns* of parts, of how various departments are linked together
Achieving objectives related to the parts (suboptimization)	Achieving objectives related to the whole organization
Inability to influence internally oriented core activities; internal core is the organizational structure, goals, processes, and so on (a rigid structure is what Argyris has in mind)	Ability of the organization as an organism to influence internally oriented core activities "it" desires; flexible organizational structure
Inability to influence externally oriented core activities—that is, activities aimed at the environment; an organization that feels fenced in by its environment	Ability of the organization as an organism to influence externally oriented core activities "it" desires; pro-active (as against a "reactive") organization
Nature of core activities influenced by the present only (shortsightedness)	Nature of core activities influenced by past, present, and future

(From Khandwala, P. N. The Design of Organizations. New York: Harcourt Brace Jovanovich, 1977, p. 193.)

The work of March and Simon (1958) is the archetype of the Decision Theory School, which utilizes the individual perspective in studying the decision-making process in organizations (Simon, 1960; Cyert and March, 1972). To them, an individual intends to be rational in his decision making in terms of evaluating the costs and benefits of various alternatives before making a decision. This process is carried out, however, in the absence of perfect information and with limited capacity to process the available information. This limits the "search" for alternatives and results in "satisficing" rather than "maximizing" behavior. It also sets in process routine patterns of behavior within the organization to deal with recurrent stimuli (e.g., each time an order is received, certain steps are immediately put into operation), and a tendency to use rules of thumb in decision making. Decision making is, therefore, very predictable except when a problem situation arises. Then a search for a solution is made, but it is usually a local search and leads to incremental rather than radical change. The decision-theory equivalent of an organization structure is a collection of these decision programs, and the organization's goals are achieved through a series of means-ends hierarchies.

A major difference of the decision-theory school compared with the schools of thought discussed earlier is that it is descriptive rather than normative. It tells you what happens, not what should happen. The key attributes of this school are described in Table 5.

Table 5

The Decision Theory School

Key Attributes

- Organization's goals broken down to departmental subgoals
- Means-ends hierarchy
- Satisficing behavior
- Sequential and limited search processes
- Specialization of activities and rules
- Rules and programs for recurring situations
- Training and indoctrination to channel individual's behavior
- Divide goals and tasks into programs to reduce interdependencies
- Unobtrusive control mechanisms
- Change individual behavior by changing decision-making premises

Criticisms

- Inadequate consideration of human needs
- Descriptive rather than normative
- Does not deal adequately with variations across firms

The Systems Theorists view the organization as a system with a supply of resources (input), a conversion process (throughput), and the production of objects (output)(Silverman, 1971; Katz and Kahn, 1966). As systems, each organization has a set of interdependent parts (Leavitt, 1965; Thompson, 1967) and a series of needs to be satisfied for survival (Etzioni, 1961; Parsons, 1951; 1960). The Open Systems theorists are distinguished from the Closed Systems theorists in that the former view the import and export of energy as taking place with respect to the external environment (Von Bertalanffy, 1950, 1956; Katz and Kahn, 1966, 1978; Emery and Trist, 1960). They have criticized the Closed System theorists for not recognizing fully the dependence of organizations on inputs from their environment, and for overemphasizing principles of internal functioning. The Open Systems approach "begins by identifying and mapping the repeated cycles of input, transformation, output, and renewed input which comprise the organizational pattern" (Katz and Kahn, 1978, p. 33). The various generic subsystems of an organization are: the production or technical subsystem that is concerned with the throughput; production-supportive structures to provide a continuing source of production inputs; an institutional supportive function to maintain favorable relations with other structures in society; maintenance structures to insure the availability of human resources; adaptive structures to generate appropriate responses to changes in the environment; and a managerial subsystem to coordinate and control the various substructures. These are the various subsystems used by Open Systems theorists to describe organizational functioning. Their implications for the subsystem's values and organizational mechanisms are shown in Table 6. The criticism leveled against this theory is that though it highlights the interrelationships between the many subsystems of the organization, it does not examine in sufficient detail the implications of these interrelationships for organization design.

TABLE 6

OPEN SYSTEMS THEORY

Formal Subsystems of Organizations:
Their Functions, Dynamics, and Mechanisms

	Subsystem Structure	Function	Dynamic	Mechanisms
I.	Production: primary processes	Task accomplishments: energy transformation within organization	Proficiency	Division of labor: setting up of job specification and standards.
II.	Maintenance of working structure	Mediating between task demands and human needs to keep structure in operation	Maintenance of steady rate	Formalization of activities into standard legitimized procedures: setting up of system rewards; socialization of new members
III.	Boundary systems			
A.	Production-supportive: procurement of materials and manpower and product disposal	Transactional exchanges at system boundaries	Specifically focused manipulation of organizational environment	Acquiring control of sources of supply; creation of image.
B.	Institutional system	Obtaining social support and legitimation	Societal manipulation and integration	Contributing to community, influencing other social structure.

(From Katz, D., and Kahn, R. L. The Social Psychology of Organizations. New York: John Wiley, 1978, second edition, p. 84.)

TABLE 6 (continued)

	Subsystem Structure	Function	Dynamic	Mechanisms
IV.	Adaptive	Intelligence, research and development, planning	Pressure for change	Making recommendations for change to management.
V.	Managerial	1. Resolving conflicts between hierarchical levels	Control	Use of sanctions of authority.
		2. Coordinating and directing functional substructures	Compromise vs. integration	Alternative concessions; setting up machinery for adjudication.
		3. Coordinating external requirements and organizational resources and needs	Long-term survival; optimization, better use of resources, development of increased capabilities	Increasing volume of business; adding functions; controlling environment through absorbing it or changing it; restructuring organization.

(From Katz, D., and Kahn, R. L. The Social Psychology of Organizations. New York: John Wiley, 1978, second edition, p. 84.)

The Contingency School theorists essentially posit the "If A, then B" kind of relationship between key contextual variables and elements of organizational structure. In many ways it is a compromise with practice for the theorists in search of the "ideal organizational form." The central questions asked by this school are: "Upon what key contextual variables is the effectiveness of an organization's design contingent? What patterns of relationships exist between these key contextual variables and elements of structure?"

These questions have been addressed by many researchers. Burns and Stalker (1961) studied the relationship between the rates of technological and market change and the pattern of management practices. They found two very different patterns that were both effective but under different environmental conditions. The "mechanistic" system, which has precisely defined methods, duties, roles, and hierarchy, was very effective in relatively stable environmental conditions. The "organic" system, with high lateral interaction and a less formal definition of methods and roles, worked best under changing environmental conditions.

Lawrence and Lorsch (1967) reached essentially the same conclusion. They studied the degree of "differentiation" (defined as the difference in cognitive and emotional orientation among managers in different functional departments) among departments within the same firm, and the degree and type of "integration" (defined as the quality of the state of collaboration among departments) required across departments within the firm. Their findings showed that dynamic and complex environments require considerably more differentiation among departments than relatively stable and simple environments. Also, a high degree of differentiation necessitated a sufficient level and quality of integrative mechanisms working across departments. These general relationships are well summarized in Table 7.

TABLE 7

Toward a General Contingency Model of
Organization-Environment Relations

STRUCTURAL DIFFERENTIATION	STRUCTURAL FLEXIBILITY: High (Organic)	STRUCTURAL FLEXIBILITY: Low (Mechanistic)
High (Differentiated)	Complex and Dynamic Environment Description: Organization operating in an environment consisting of a large number of different components all rapidly changing. Example: Aerospace Firm	Complex and Stable Environment Description: Organization operating in an environment consisting of a large number of different but relatively stable components. Example: Multiple-line Insurance Company
Low (Undifferentiated)	Simple and Dynamic Environment Description: Organization operating in an environment consisting of a few basically similar components all rapidly changing. Example: Custom Handling Systems Producer	Simple and Stable Environment Description: Organization operating in an environment consisting of a few basically similar but relatively stable components. Example: Container Manufacturer

(From Miles, R. H. Macro Organizational Behavior. Santa Monica, CA: Goodyear, 1980, p. 273.)

The two researchers discussed above related organization design with the degree of complexity and the rate of change in the environment. But there are also contingency theorists who have studied the effect of an organization's technology, defined as "the techniques used by organizations in work-flow activities to transform inputs into outputs" (Porter, Lawler and Hackman, 1975), and organization design. These include Thompson (1967), Perrow (1967), Udy (1959), Hickson et al. (1969), and Woodward (1958, 1965, 1970). Various typologies of technology have been proposed.

Thompson's typology includes: "long-linked technology," characterized by serial interdependence of a number of different operations (assembly line); "mediating technology," characterized by processes that join together otherwise independent elements of a system (banks); and "intensive technology," characterized by the use of a variety of techniques to solve a particular problem (construction companies).

Perrow focused on the routine versus nonroutine dimension, and Woodward studied patterns of organization in firms with unit production, mass production, and process production. Woodward also found that successful unit-production firms and process-production firms were typified by fewer rules and more flexibilty in interpersonal relations relative to the mass-production firms. In the mass-production category, successful firms actually emphasized tighter controls and specialization. These "contingent" relationships between dimensions of the technological process and effective organization design are also corroborated in the other research cited above.

The contingency school, based on its empirical research and logical propositions, has grown to be in many ways the most important influence on the practice and research in organizaton design. Critics tend to decry the attitude of external determinism that it suggests. Must organizations always adapt <u>to</u> the environment? Contingency theorists would answer in the affirmative.

One final school of theory that should be mentioned is the <u>Institutional School</u> (Selznick, 1949, 1957; Pfeffer, 1976). Selznick differentiates between an "organization" as a "lean, no-nonsense system of consciously coordinated activities" and an "institution," which is "more nearly a natural product of social needs and pressures." According to this school, the key tasks of leaders are:

1. "The definition of institutional mission and role," done so as to take into account the strivings, inhibitions, and competencies that exist within the organization, and the external expectations that determine what must be sought or achieved if the institution is to survive.

2. "The institutional embodiment of purpose" so that policy is built into the organization's social structure.

3. "The defense of institutional integrity" as a means of survival. Institutional survival means maintaining the values and distinctive identity of the institution.

4. "The ordering of internal conflict." This means the effective management of internal interest groups so as to win the consent of constituent units and allowing emergent interest blocs a wide degree of representation while maintaining an appropriate balance of power.

III. THE ORGANIZATIONAL CONTEXT

Thus far, we have reviewed brief summaries of organization theorists with different points of view about organizations. From the variety of theories available, it is obvious that the answers to the questions raised by organizational design do not lend themselves to easy recipes for managerial decisions. The contingency school has also pointed out that in designing the proper structure for his organization, the manager is constrained by a number of factors largely outside his control. For this reason, no one structure is ideal for all organizations. Each organizational design must be suited to its own combination of internal and external pressures. The central question then becomes:

"Given the kind of environment I must work in, and given the kinds of pressures I have no control over, how should I structure those elements of the organization which I can control, so as to achieve an optimum level of performance?"

In this section we will explore the implications of the first part of this question, namely, understanding the environment and other contextual factors that constrain the design of the organization.

Military organizations exist in comparatively different environments from civilian organizations. A key variable, as Lang (1965) points out, is the policy-making environment. For instance, the decision to abolish or revive conscription is largely outside the control of operating managers in the military. Yet its effect on organizational structure is something with which military leaders have to cope. Moskos (1977), for example, argues that the shift to an all-volunteer force implies changes in the reward structure of the military: heavier emphasis on job-specific rather than institutional rewards, and greater use of civilians, with an accompanying change of structure. Because military environments are somewhat different, the variables in this section contain a framework for looking at the context in which organizations operate.

Analysis of the Environment[1]

The reason for the importance given to understanding the environment is that features of the environment cause managerial uncertainty regarding the suitability of decision alternatives (Miles, 1980). Miles also synthesizes the most important dimensions of uncertainty for managerial decision makers as:

- Uncertainty regarding information availability, accuracy, and clarity;
- Uncertainty regarding cause-effect relationships;
- Uncertainty regarding outcome preferences;
- Uncertainty deriving from time span of definitive feedback;
- Uncertainty deriving from the inability to assign probabilities to events.

The organization has to be able to cope with all these kinds of uncertainty by creating managerial roles and units that "buffer its technological core" (Thompson, 1967). For example, a manufacturing firm faced with a great deal of uncertainty regarding the procurement of raw materials may buffer its core production process against fluctuations by setting up a sophisticated inventory control system. Thus, it is necessary to understand the nature and source of uncertainty that the organization faces.

From the research on dimensions of the environment (Table 8) three distinct clusters of environmental dimensions have emerged (Miles, 1980). The three clusters are composed of 1) static dimensions, 2) dynamic dimensions, and 3) receptiveness dimensions. The static cluster includes environmental complexity, routineness of organization-environment relations, degree of interconnectedness among environmental components, and the extent to which important environmental parts are in direct or indirect contact with the focal organization. The dynamic cluster includes the change rate and the unpredictability of

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[1]Defining what the organization's environment actually is is not always a simple question. (Terreberry, 1968; Dill, 1958; Hall, 1977). Hall distinguishes between the General Environment, which must be of concern to all organizations--the economy, demographic changes, and so on--and the Specific Environment, such as other organizations with which it interacts or particular individuals who are crucial to it. As Miles (1980) points out, the general environment has an impact on both the focal organization and members of the surrounding organization.

Table 8

Dimensions of Organizational Environments

ORGANIZATIONAL THEORISTS AND RESEARCHERS	DIMENSIONS	
Theorists:		
Emery and Trist (1965); Terreberry (1968)	Disconnected Placid	Interconnected Turbulent
Thompson (1967)	Homogeneous Stable	Heterogeneous Shifting
Aldrich (1972)	Stability Concentrated Lean capacity Domain consensus Homogeneity Placidness Mutability	Instability Dispersed Rich capacity Domain dissensus Heterogeneity Turbulence Immutability
Child (1972)	Stable Simple Liberal	Variable Complex Illiberal
Researchers:		
Dill (1958)	Homogeneous Stable Unified	Heterogeneous Rapidly shifting Segmented
Burns and Stalker (1961)	Low volatility	High volatility
Lawrence and Lorsch (1969)	Low diversity Stable	High diversity Dynamic
Duncan (1972)	Simple Static	Complex Dynamic
Tosi, Aldag, and Storey (1973)	Low volatility Market Technological Composite	High volatility Market Technological Composite
Hinings, et al. (1974)	Stable Predictable Low feedback assurance Causal knowledge Specificity Speed	Unpatterned variability Unpredictable variability High feedback assurance Causal knowledge Specificity Speed
Osborn and Hunt (1974)	Homogeneity Low dependency	Heterogeneity High dependency
Pennings (1975)	Low complexity Low demand volatility Sparseness	High complexity High demand volatility Resourcefulness

(From Miles, R. H., Macro Organizational Behavior. Santa Monica, CA: Goodyear, 1980, p. 221.)

change. The effect on the organization of these six dimensions is conditioned by dimensions in the last cluster, receptiveness, which includes resource scarcity, output receptivity, and domain-choice flexibility. These three clusters together influence the level of decision-making uncertainty in organizations--and have definite implications for organization design.

Linkages to the military's external environment are discussed in Bachman, 1975; Cotton, 1975; Kelleher, 1978. The effect of the change from conscription to recruitment, for example, adds the environment of a competitive labor market as an implication in military structures; at the same time it changes the relationship to civilian environments--making some of them more remote (Van Doorn, 1975).

These implications/propositions are stated below:

- The more complex the environment in terms of the number of different groups you have to interact with,

  1) the more the need for internal differentiation of roles;

  2) the more the need for complex coordination and integrative mechanisms;

  3) the more the need for sophisticated boundary spanning units.

- The more routine the demands of the environment in terms of repetitiveness and similarity,

  1) the more programmed the organization's responses can be;

  2) the more automated its operations can be.

- The greater the interconnectedness between components of the environment,

  1) the more the need for multilateral strategies on the part of the organization;

  2) the more the need for interdisciplinary work teams;

  3) the more the need for participatory decision making;

  4) the more the need for coordinated responses.

- The greater the remoteness of important elements of the environment (in the sense that important agents of change are not in direct contact with the organization),

1) the more difficult it is to anticipate and cope with events;

2) the greater the need to build buffers against uncertainty.

- The greater the rate of change of key components of the environment,

  1) the more planning-oriented the organization;

  2) but the more unpredictable the change in terms of unpatterned variability that cannot be anticipated by the planning process;

  3) the more flexible the organizational tasks and internal roles;

  4) the more participative the top-management style;

  5) the more important frequent performance reviews are.

- The higher the scarcity of input resources in the organization's environment,

  1) the more efficiency-oriented and standardized its operations;

  2) the more the exercise of centralized control by top management over the input system.

- The more receptive the environment to the organization's outputs,

  1) the greater the internal "slack" within the organization;

  2) the more risk-taking and innovative top management can be.

- The greater the flexibility that can be exercised by top management in choosing its domains of operations,

  1) the less likely are the restrictive impacts of the environmental dimensions listed above.

These propositions are summarized in Table 9.

Organization Goals

The goals that an organization is expected to achieve and the function it fulfills in society is an important contextual

Table 9

Propositions for Organizations:
The Implications of Dimensions of the Environment

Complexity	Internal Differentiation Coordination and Integration Sophisticated Boundary Spanning Units
Routineness	Programmed Responses Automated Operations
Interconnectedness	Multilateral Strategies Interdisciplinary Work Teams Participative Decision Making Coordinated Responses
Remoteness	Buffers Against Uncertainty
Rate of Change	Planning Orientation
Unpredictability of Change	Flexible Organizational Tasks and Internal Roles Participative Decision Making Frequent Performance Reviews
Scarcity of Resources	Efficiency Orientation Standardization Centralized Control Over Inputs
Receptiveness to Outputs	Internal Slack Risk Taking and Innovativeness
Flexibility in Domain Choice	Restrictive Impacts of Environment Dimensions Decrease

variable that influences the design of the organization (Richards, 1978).

Etzioni (1964) distinguished between three types of organizational goals. Organizations with economic goals produce services and goods for consumption by outsiders. Organizations with order goals attempt to "control actors who are deviants" (e.g., mental hospitals, prisons). Organizations with sociocultural goals attempt to create new cultures or contribute to the preservation of a cultural heritage or specialize in the application of culture (e.g., universities, research organizations, or professional organizations). Etzioni also found that economic organizations rely primarily on remunerative control schemes, order organizations rely on coercive control measures, and sociocultural organizations need voluntary compliance based on charismatic leadership or strong personal identification with the mission of the organization.

Blau and Scott (1962) have a typology based on the "prime beneficiary" of the organization, as below:

"Mutual benefit" (primarily benefiting the membership)
"Business concerns" (benefiting the owners)
"Service organizations" (benefiting the clients)
"Commonweal organizations" (benefiting the public at large)

The major internal problem facing the organization varies with each type: internal democracy for mutual-benefit organizations, efficiency for business concerns, a professional structure for service organizations, and a bureaucratic structure for commonweal organizations.

Goals also influence the design of the organization to the extent that they supply criteria for assessing organizational effectiveness and member contribution (Scott, 1977). Goals that are stated unambiguously, that are not subject to constant change, and that are readily operationalized into "hard," particularly quantitative performance criteria, exert a greater structural influence than those that are equivocal, ephemeral, and abstract (Miles, 1980).

One can also distinguish between goals on the extent to which they are actually realized (Steers, 1977). Official goals are "the general purposes of the organization as put forth in the charter, annual reports, public statements by key executives" and are usually publicized widely to secure the support of important external groups. Operative goals designate organizational intentions or what the organization is trying to achieve (Perrow, 1961). Finally, Operational goals are those "for which there are agreed-upon criteria for evaluating the extent to which organizational activities contribute

to goal attainment." It is when goals reach an operational level, as in management-by-objectives systems, that they can be counted on to serve reliably as forms of structure within organizations, and the variance between levels and units in terms of operational goals can serve as an indicator of the degree of structural differentiation within organizations. This differentiation of operational goals takes place both vertically and horizontally (Kast and Roesenzweig, 1974).

The implications of the organizational-goal structures for design include:

- The more business oriented the organization, the more it views internal efficiency as the primary criterion of performance.
- The more the organization is oriented toward mutual benefit, the more the use of internal democracy and participatory processes.
- The more the organization is oriented toward servicing clients, the more the use of professionals and professional codes of performance, and of knowledge and expertise.
- The more the organization is oriented toward the general public, the more bureaucratic it tends to become.
- The more equal the balance between operative goals and operational goals, the more performance-oriented the organization will be, and the more measurable the overall organizational performance will be.
- The more specific and measurable the operational goals, the more the performance evaluation and reward systems are based on predefined standards.
- The more the horizontal differentiation of goals, the more the need for specialized departments and the greater the need for integrative mechanisms.

Technology

As part of our review of the contingency school, we have already mentioned some of the research linking organizational design to the technological imperatives faced by the organization. The role of technology in changing the structure of the military is a key debate in current military sociology. Janowitz (1971) argues that the increasing complexity of technology forces key changes in the organizational structure of the military. Some recent studies have disputed this (Garnier, 1975; Hacker, 1977; Buhl, 1974). However, most of these studies

are at a macro level, not related to day-to-day work flow or design. Khandwala (1977) lists several propositions relating the research on work flow and technology to organizational design, as below:

Propositions

1. The more strategic the location of a department or a work unit in the work flow of an organization--as judged by how well it copes with task uncertainties, the swiftness with which its actions affect the organization's outputs, the nonsubstitutability of its functions, and the pervasiveness of its work connections with other departments--the greater is its power.

2. The higher the wage rate of operations personnel in a society or an industry, the more capital-intensive is the operations technology employed by organizations functioning in that society or industry, and vice versa.

3. The more technologically sophisticated and complex the industry, the more capital-intensive is the operations technology of the organizations functioning in that industry.

4. The more capital-intensive the operations technology of an organization gets, the more active become the operatives' needs for job security, growth, self-actualization, power, autonomy, and participation in decision making.

5. The more capital-intensive the organization's operations technology gets, the more sophisticated become the organization's control and incentive system; the more professionalized its work force gets; and the more organic and participative is supervision at the operating levels.

6. The greater the importance of diversification to top management, the less oriented the organization's technology is to standardized mass outputs and the more oriented it is to customized outputs.

7. The more the operations technology of an organization is geared to standardized mass outputs of goods or services, the more vertically integrated and decentralized the organization tends to become and the more sophisticated is its control and information system; the more rigidly departmentalized and structured are its activities; and the more attention needs to be paid by management to human relations to maintain a given level of morale among operatives.

8. The larger the organization, the wider its distribution network; the more technologically complex its external

environment, and the more restrictive the environment, the more extensively does the organization use an electronic data processing system.

9. The greater the use of an electronic data processing system, the more it facilitates decentralization, and the more it permits quicker and more integrated decision making.

10. The more quantifiable the informational inputs or outputs of a department, the greater is the impact of the computer on the administrative structure of the department in terms of increased power of EDP specialists, reorganization of the work flow, and greater complexity in the job of the departmental manager.

Khandwala also explores the implications for design based on whether an organization is involved in the production of goods or the provision of services.

11. The more the organization is geared to the production of goods rather than services, the greater is the mechanization of operations, and the lower is the extent of face-to-face transactions with the organization's customers.

12. The more the organization is geared to the production of goods rather than services, the more sensitive--other things being equal--are the relations between management and workers, and the greater is the pressure for growth, full utilization of capacity, and vertical integration.

13. The more the organization is geared to the production of services rather than goods, the more of a "service to the client" ideology it holds, the more oriented it is to marketing and customized operations and the more decentralized and organically managed it is.

14. The more the organization is geared to the production of goods that can be sold from inventory, the greater is its management's concern with operating efficiency and a wide distribution network; the more standardized are the organization's operations; and the more vertically integrated does the organization strive to be.

15. The more the organization is oriented to selling goods prior to their manufacture, the more it is characterized by project groups and a matrix structure.

Age and Size

Two contextual variables that are related to the organization structure are the age and size of the firm. Mintzberg (1979) does an extensive review of the literature and proposes several hypotheses:

- The older the organization, the more formalized its behavior. As organizations age, much of the work is repetitive and hence becomes more predictable and amenable to formalization. (Starbuck, 1965; Samuel and Mannheim, 1970; Inkson, Pugh, and Hickson, 1970).

- Structure reflects the age of founding of the industry. On the basis of work by Stinchcombe (1965) and others, he proposes that patterns of similarity exist between organizations operating within an industy, and that the age of the industry influences these patterns.

- The larger the organization, the more elaborate its structure; that is, the more specialized its tasks, the more differentiated its units, and the more developed its administrative component. It tends toward a taller administrative hierarchy, and toward more sophisticated control and information systems. Chandler (1962) and Scott (1971) point out typical structural patterns as firms grow. They integrate vertically, taking over some activities from its suppliers and customers; then it diversifies with new products and markets, and this necessitates further differentiation and more sophisticated integration. Childers (1971) confirms this model for military organizations.

- The larger the organization, the larger the size of its average unit; and the larger the organization, the more formalized its behavior. As the size of the organization increases, the span of control of its executives and managers also increases. Mintzberg points out that with increasing size, positions in the organization become more specialized, and the units more differentiated, each unit thus becoming easier to manage. Unit size is also influenced by the rate of growth; an organization grows continuously but its structure is changed only in discrete steps.

  The formalization in the behavior of the larger organization is similar to that in the older organization. Size also leads to repetition and hence predictability that can be formalized.

Human Resources

A final contextual variable that has critical implications for evaluating the design of the organization is the human resources available to the organization. The effect of this variable on the military has been discussed extensively (Janowitz, 1973, 1972; Fabyanic, 1976; Garnier, 1973; Cotton, 1975). They basically examine changes in reward structure--compensation, promotion policy--rather than structural dimensions. As Porter et al. point out, if employees tend to be especially skilled and well educated, it is likely that a high degree of formal specification and standardization of activities, and the imposition of close and severe controls, would result in an inefficient use of human resources, from both the individual's standpoint and the organization's standpoint, possibly resulting in frustration and overt resentment. The reverse situation is also possible, i.e., structuring operations as if the work force had high skills when this is not the case can also result in insecurity and frustration.

The distribution/dispersion of skills in the organization can also be critical. If one part of the organization has a significantly different level of skills compared with others, the structural configuration must also differentiate appropriately. Finally, needs, personality traits, and cultural influences upon the work force which an organization attracts need to be considered, for these variables affect not only their performance but also how they will perceive the organization's system. The differing expectations of enlisted men and officers, for example, is cited by Margiotta (1976), and Bachman (1975) as a key tension in integrating formal military structures.

IV. ORGANIZATION STRUCTURE

Just as there are few factors completely beyond managerial control, so are there few elements of structure completely under managerial control. However, in designing the structure and operating mechanisms of his organization, the manager has greater discretion than he does in controlling features of the contextual elements. Beishline (1950) clearly describes the contemporary military structure as a functional hierarchy with staff-line operations. Staff essentially support managers at key locations in the structure. Palen (1972) argues that the military, as a result of recruitment base, education, and careerism, is moving towards a "bureaucratic-managerial" model of organization. Head (1973) in an analysis of military decision making argues that the military is increasingly resembling a "professional-organization" model, in which decision making is informed by inputs being made on the basis of role or expertise rather than functional position. The straight functional model is one which may have numerous variations in practice despite formal lines of authority (Mintzberg, 1979). In this section, we shall explore some ways of thinking about structure and operating mechanisms, examining their effectiveness in different circumstances. In doing so we will be drawing upon the writings of several authors not yet referenced in this report (Ranson, Hinings, and Greenwood, 1980; Oldham and Hackman, 1981; Walton, 1981; Galbraith, 1973; Kolodny, 1979; Grinyer and Yasai-Ardekani, 1980; Griffin, 1980; Morris, Steers, and Koch, 1979; Tung, 1979; Allen, 1979; Pugh and Hickson, 1976; Child, 1977). These authors have all discussed different aspects of the structural factors and operating mechansisms that constitute the organization design. Primary references, however, will be the works of Child, Khandwala, and Mintzberg.

Groupings of Personnel. The organization chart is a pictorial representation of the formal links between different units and dimensions. It is this process of grouping that establishes the systems of formal authority and builds the hierarchy of the organization, and is a fundamental means to coordinate work in the organization.

The problem in grouping tasks together arises, however, because tasks can be grouped together on a number of different logical bases (Child offers a very comprehensive and lucid review in this area). Possible bases for grouping are:

-- Grouping by shared expertise

-- Grouping by function and work process

-- Grouping by product or service

-- Grouping by time horizon

-- Grouping by geographical location

These task-system logics can result in different kinds of structures. Among the two most well known are the functional and the product based structures.

The functional form groups activities that provide particular contributions to a product into separate departments, the most common example being that of a firm with separate departments for manufacturing, marketing, finance, etc. This form is used particularly often when the organization has a single or closely related range of products or services serving one domestic market. Formal coordination is achieved by the General Manager. A simple functional structure is shown in Figure 1.

The functional form has a number of advantages:

-- Simple structure

-- Generally more efficient

-- Minimal conflict between departments, little overlap

-- Centralized coordination--economies on managerial manpower

-- Maximum utilization of scarce resources--economies of scale

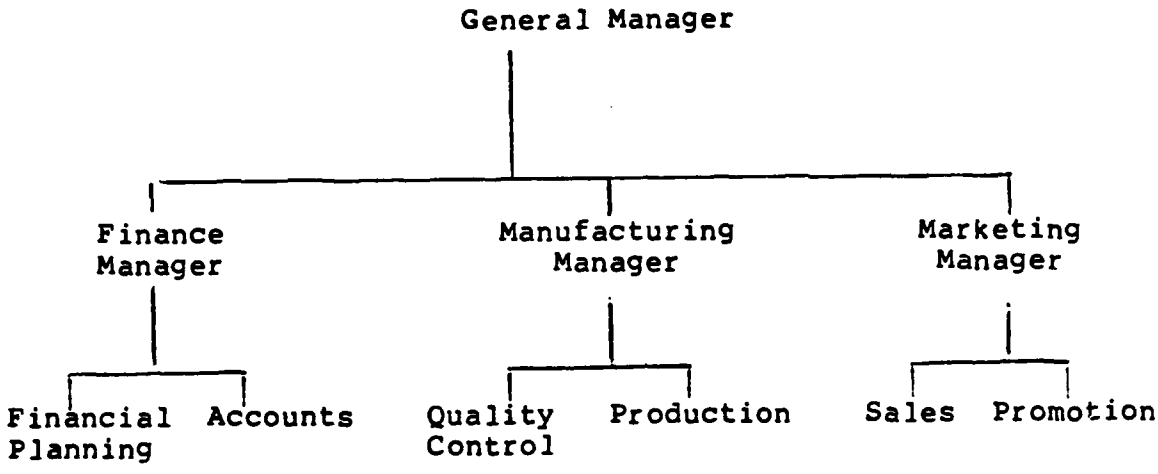
-- Clear career paths for specialists

-- Creates peer groups with similar interests and expertise

The functional form is, however, frequently unable to cope with diversification of products and markets (or services and customers), particularly if these require different skills and technologies. The functional form is inherently a centralized structure. Thus, communication overloads, delays, and too much top-management time on day-to-day decisions and conflicts may indicate a need to move towards a structure in which coordination is decentralized within a product (or service) group, or division.

Figure 1

Functional Structure



As the organization diversifies into multiple product lines or services and markets, the needs for coordination become more complex. The company may simultaneously be competing in different markets, manufacturing different products, providing different services, and using different technologies. At this stage, each product, service, or market group may have needs similar to an independent business, and a division form becomes more appropriate. The divisions may be based on product lines or geographical areas, depending on whether product groups or appropriate geographic areas are the greater source of differentiation. Its advantages are particularly pronounced if the product markets on which the form is based face rapidly changing environments with high competitive pressures necessitating quick responses. The divisional form has the advantage of directing specialized contributions to a common localized focus with decentralized responsibility for coordination and decision making.

The conglomerate organizaton is also an extension of the philosophy of the divisional organization. Here, however, each division is an autonomous firm and the degree of independence is much higher. It may have evolved in response to a situation where the size is very large, or the functional and geographic interdependence is extremely low. It is thus more adaptive than the functional form. Its advantages are:

-- More responsive to environment

-- Functional specialists more aware of common product goals

-- Lends itself to easier performance measurement, e.g., profit centers

-- More effective communication

-- Conflicts resolved at lower level in organization hierarchy

-- Better integration between functions

-- Motivates middle managers and provides early training in general management

-- Provides top management with more time for strategic issues

In certain situations, divisional forms have some major disadvantages. There may not be a clearly superior basis on which to create divisions in the first place. Divisionalization by product or service may lead to poor coordination and even competition between separate divisions dealing with the same client, and geographic divisionalization may lead to duplication of production facilities. There may also be conflicts between

divisions over the allocation of centralized resources. The bottom-line performance orientation of the divisional form that is considered to be one of its advantages can also be dysfunctional. The alternative form that emerges is a Mixed structure. It incorporates more than one logic of grouping activities.

Several variations of mixed structures are possible. For example, the need for economies in production or research may necessitate grouping all those activities into one function, while segmenting responsibility for marketing activities by area or product. This results in a structure as shown in Figure 2.

Alternatively, divisions may be operated as profit centers, with centralized resources in, for example, Finance and Planning, as shown in Figure 2a.

A systematic method for analyzing the grouping of activities is discussed in Child (1977) and has been reviewed in Appendix 1.

The mixed structure that has become best known in recent years, however, is the matrix, in which one logic of grouping activities is superimposed totally on another. While there are no discussions in the literature of the use of matrices in Western military organizations, Herspring (1975) charts the development of a dual hierarchy with increased internal controls in East Germany. Mahoney (1977) examines the uses of matrix organization in the Soviet Union. Davis and Lawrence (1977) define matrix as "any organization that employs a multiple command system that includes not only a multiple command structure but also related support mechanisms and an associated organizational culture and behavior pattern." They conclude that the matrix is the preferred structural choice when three basic conditions exist simultaneously.

The first condition is "outside pressure for dual focus." This is why the matrix first came into widespread use in the aerospace industry, where it is essential to focus intensive attention both on complex technical issues and on the unique project requirements of the customer. A balance of power was needed between customer-specific project-oriented managers and the managers of the engineering and scientific specialists.

The second condition for a matrix is "the requirement for high information-processing capacity among organizational members." This occurs when the kinds of demands placed on the organization are changing and relatively unpredictable; the simultaneous diversifications of products/services and markets have increased the complexity of the organization's tasks; and, finally, there is high interdependence among the people because their tasks are highly interrelated. These three determinants of information load--that is, environmental uncertainty, opera-

Figure 2

Mixed Structure

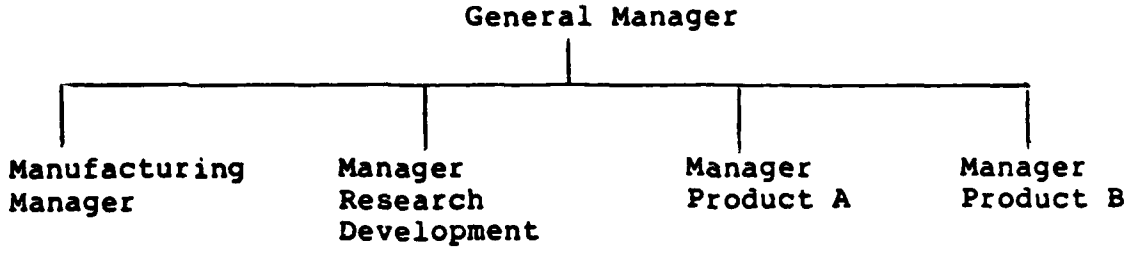
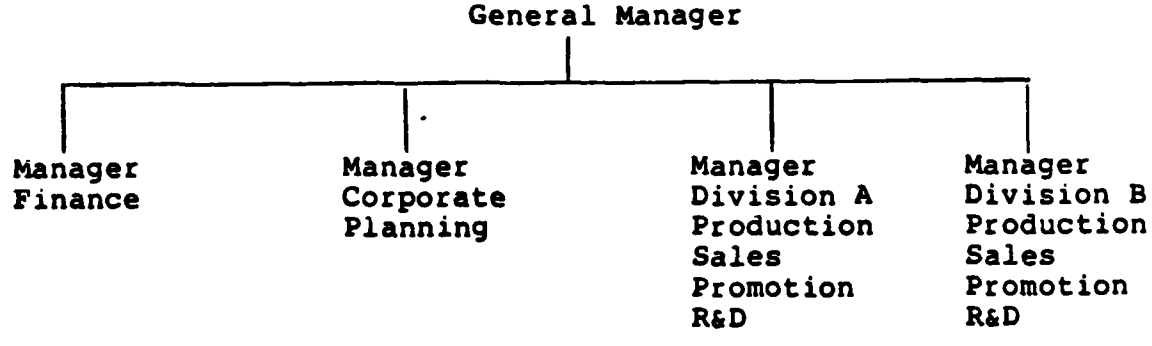


Figure 2a



tional complexity, and task interdependence--determine the level of information-processing capacity needed within the organization.

The third condition for a matrix requires that the organization be under "considerable pressure to achieve economies of scale in human terms and high performance in terms of both costs and benefits by fully utilizing scarce human resources and by meeting high-quality standards." It is only when such a pressure exists that resources need to be deployed in a flexible manner so that people can work on more than one task at a time, and central facilities have high utilization through effective sharing among user groups.

These conditions are summarized in Table 10.

A typical matrix design discussed by Davis and Lawrence is shown in Figure 3. The two arms of the diamond symbolize the dual chain of command. In their typical case, the left arm has the functional specialist groups, and the right arm has the various products/projects/markets the organization services. At the foot is the two-boss manager who is responsible for a defined package of work, and draws upon functional assistance and equipment resources from the superior on the left-hand side, and works with performance targets and requirements from the output oriented superiors on the right-hand side. The structure thus attempts to retain the economic operation and development of technical capability associated with the functional grouping of common human resources, and to coordinate these resources in a way which applies them effectively to different organizational outputs (A matrix structure in a diversified manufacturing firm is shown in Figure 4).

The logic of the matrix structure may be used in a temporary form as with project teams. A project team may be set up to draw resources from different functions for a special purpose, usually for a limited period of time.

The matrix structure has several advantages:

- Preserves organizational flexibility and ability to respond to changes
- Presence of formally designated multiple reporting relationships encourages open lines of communication in organization as a whole
- Releases top-management time from operational coordination
- Develops general-management skills in subordinates, while simultaneously preserving links with basic functions

TABLE 10

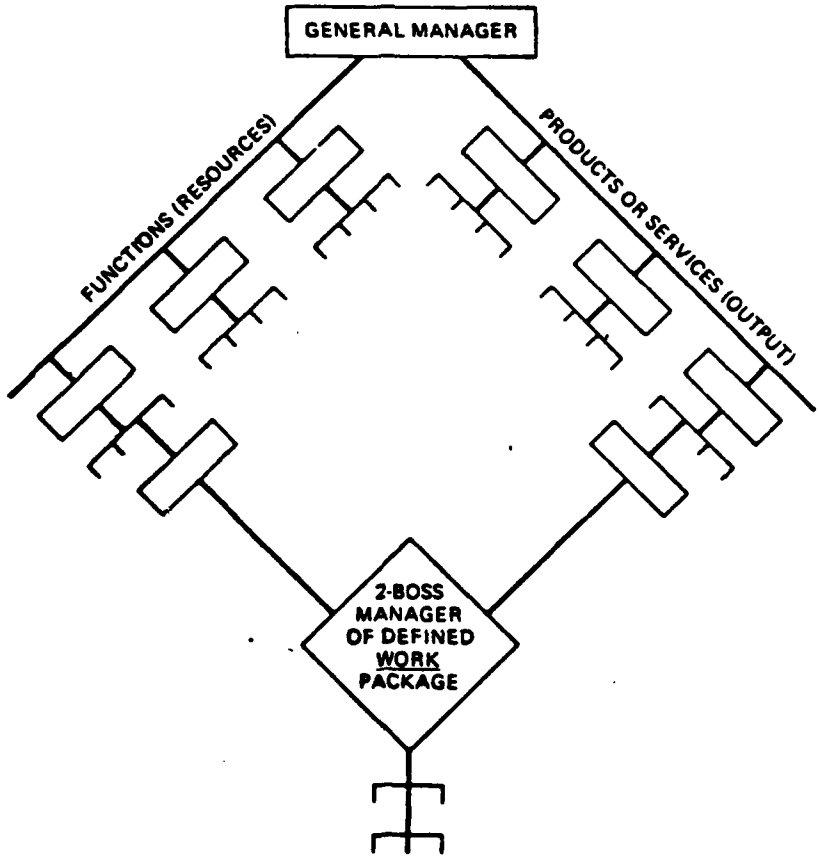
Conditions for the Matrix

	Environmental pressure	Behavioral linkage
Condition 1	Two or more critical sectors; functions, products, services markets, areas.	Balance of power, dual command, simultaneous decision making
Condition 2	Performance of uncertain, complex and interdependent tasks	Enriched information processing capacity
Condition 3	Economies of scale	Shared and flexible use of scarce human resources

(From Davis, S. M., and Lawrence, P. R. Matrix. Reading, MA: Addison-Wesley, 1977, p. 20.)

Figure 3

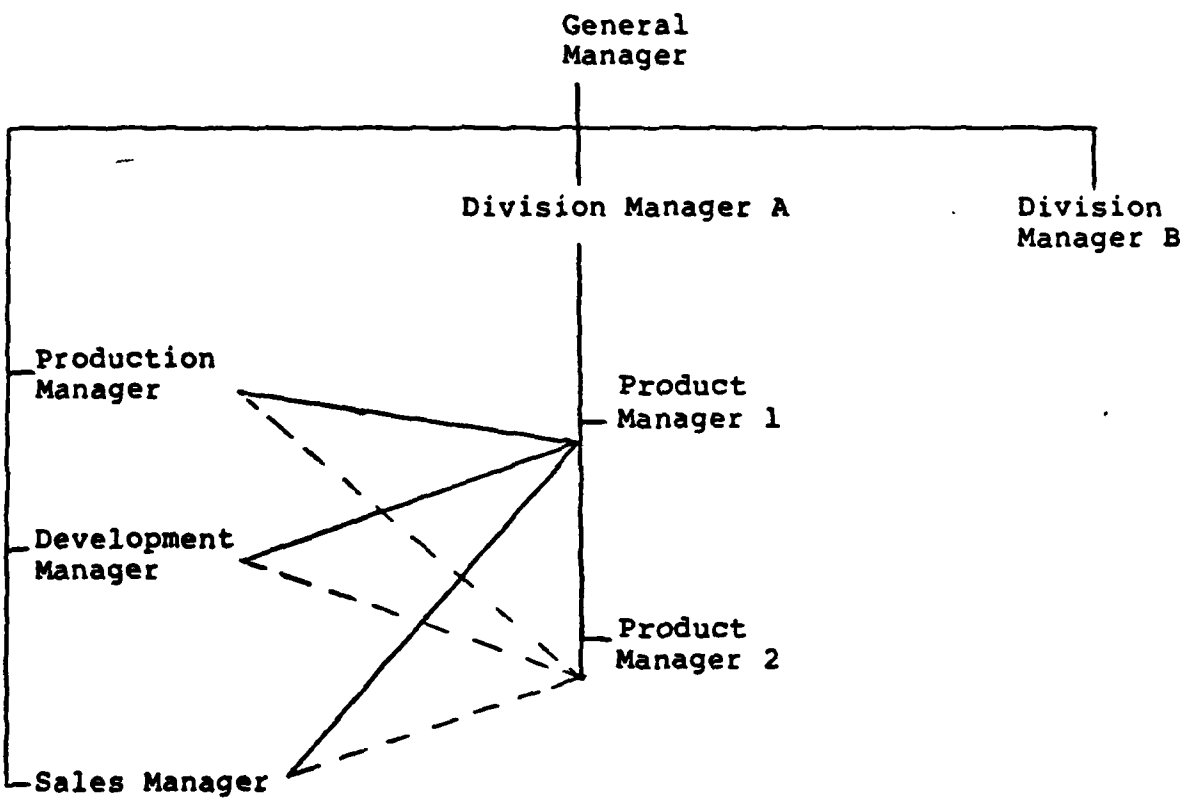
The Matrix Design



(From Davis, S. M., and Lawrence, P. R. Matrix. Reading, MA: Addison-Wesley, 1977, p. 19.)

Figure 4

Matrix Design in a Manufacturing Firm



However, in spite of these obvious advantages, the matrix form also has some problems unless it is carefully managed. For example:

- Tends to generate conflicting objectives and accountabilities at a personal level, creating a highly charged political atmosphere. The balance of power between the multiple-authority structures must be carefully maintained. In the matrix, conflict and stress are the price that has to be paid for adaptability and change.

- Matrix structures generally incur greater administrative costs. Mechanisms to simultaneously process information along overlapping dimensions are needed.

Davis and Lawrence (1977) have summarized the problems they have observed in organizations using the matrix form. These have been shown in Table 11.

Job Specialization and Job Definition

Three interdependent questions that managers working with the design of organizations have to answer are:

How far should jobs be specialized?

To what degree of detail should the jobs be defined?

How much discretion should job holders be given?

One group of researchers (Aston Group) studied these questions in terms of "functional specialization," "role specialization," "standardization," and "formalization."

Functional specialization was the degree to which an activity common to the organization was performed by someone, or a group of people, who performed that function and no other. Role specialization was the extent to which specialist roles existed within each of the activities of functional specialization. Standardization, a measure of the depth of routinization in an organization, was the extent to which each of several organizational activities was subject to standard procedures and rules. Formalization was the extent to which procedures, rules, instructions, and communications were reduced to written form. These factors are all components of "Structuring of Activities" whose objective is to allow the organization to carry on many activities efficiently. Structuring also facilitates the coordination of many diverse activities. It gives a great deal of stability and predictability to the ongoing activities, but at the expense of flexibility and red tape.

Table 11

The Matrix Form - Problems

Problem	Cure
1) Power Struggles - Derivative of ambiguity and shared power in the matrix	- Common superior plays strong role - Encourage competition but punish combat
1) Anarchy - Winner-take-all mentality	- Make coordination arrangements explicit
3) Groupitis - Matrix structure viewed as group decision making delays	- Educate managers about idea of matrix
4) Excessive Overhead - Dual chains of command increase managerial overhead	- Ensure complete utilization of managerial resources
5) Navel Gazing - Task interdependence leads to greater focus on internal negotiations at the expense of client focus	- Increase marketing orientation - Institutionalize matrix relationships so they become routine

Several relationships between the organizational content and decisions on "structuring" variables have been observed that could be useful to the organization designer:

1. The larger the size of the organization, the wider the range of activities and tasks. Therefore, specialization of functions and division of labor become advisable, also necessitating a greater use of formally defined duties and operating procedures.

2. If the organization under study is part of a larger organization which is bureaucratized, the focal organization will also structure its activities to a greater extent.

3. The more integrated, interdependent, and automated the work flow, the greater the need for standardization and formalized structuring of activities.

4. If the requirements that management places upon the job are such that:

    - the job is concerned with purely routine, repetitive tasks,

    - it requires little imagination and creativity,

    - it is relatively self-contained from other jobs,

    - it is relatively unchanging over time,

then a high level of specialization and formalization would be appropriate.

5. The nature of the human resources available to the organization need to be considered here. The greater their capacity, expertise, and flexibility (in terms of transferability of expertise), the less the need for narrow specialization. The more able and committed the personnel, the less the need for precise job definitions. Finally, the degree of specialization and formalization should, to the extent possible, match the expectations held by the members of the organization.

6. There must be congruence between the structuring of activities and the personal and management style being encouraged in the organization. If personal initiative is to be encouraged, too much formalization and standardization will be restrictive.

Child (1977) lists some symptoms that could indicate underlying problems in the structuring of activities. For example:

- Difficulties in achieving consensus between personnel who are contributing to a common project may mean that their jobs are overspecialized and their official frames of reference do not overlap sufficiently with those of their colleagues.

- Continuing rivalry between employees or departments may result from too great a degree of overlap between the functions they have been given or from a lack of agreed-upon policy as to their respective areas of authority and responsibility (frequently arises in organizations with dual authority structures).

- Behavioral manifestations of withdrawal from jobs, such as absenteeism, quitting, strikes, could be a result of overspecialization and formalization of roles. Where the formalization is such that the employees cannot redefine their own roles and adjust to their preferences, the overt forms of withdrawal listed above could result.

Hierarchy and Span of Control

These two elements determine the overall "shape" of the organization. Hierarchy is a measure of the vertical span of control and is the number of levels in the organization. The horizontal span of control is the average number of persons reporting directly to a supervisor. Obviously, for a given number of people the "taller" the hierarchy, the lower the average span of control will be, and vice versa.

The number of hierarchical levels has two objectives. It divides responsibility across vertical levels generally moving from relatively strategy-oriented unstructured work at the top levels to extremely structured operational work at the lowest levels. It also coordinates the diverse work of subordinates toward achieving organizational goals, and provides a mechanism for the resolution of conflicts. As the number of levels in the hierarchy increases, however, it leads to several other undesirable features. Tall structures involving many levels of management raise administrative overheads. They can also lead to a distortion of communication as it passes up and down the hierarchy. Frequently this also results in a dilution of top management control, and makes it difficult to distinguish between responsibilities at different levels. Finally, it has also been observed to have a detrimental effect on motivation, particularly at the lower levels of a "tall" structure from which the top seems to be in the clouds.

Many of these shortcomings of tall structures would suggest that the number of levels be minimized. However, serious

problems can also arise with wide spans of control.

The span of control is an indirect measure of the range of activities performed by individual subordinates; the larger the span of control of a supervisor, the narrower the range of activities performed by any individual is likely to be.

The span of control has implications for the level of supervision that is possible for the supervisor to exercise, for the kinds of tasks that can be adequately performed by the group, and for the kind of interaction that can exist within the group of subordinates and the supervisor. Many researchers have found that small groups generate a greater sense of identity and lead to higher morale.

In view of the often conflicting directives of research on span of control and number of hierarchy levels, the fundamental question for the designer becomes: "What is the optimum balance between the number of hierarchical levels and the average span of control for a particular organization?"

Woodward (1965) did some pioneering research on the relationship between technology and span of control. She found that effective firms in unit production (small batch) and process production had small spans of control, whereas mass production resulted in larger spans of control. Among the generalizable factors (Child, 1977) that should be used in deciding on an optimum span of control are:

-- The degree of interaction between the personnel, or units of personnel, being supervised

-- The extent to which informal control and information systems are used in the organization

-- The extent to which the activities of the subordinates are complex and interdependent

-- The degree of dissimilarity of activities being supervised

-- The incidence of new problems in the supervisor's unit

-- The degree of physical dispersion of activities

-- The extent to which the supervisor must carry out nonmanagerial duties, and the extent of demands on his time from other people and units

-- The extent to which the activities being carried out by subordinates are nonroutine

-- The extent to which subordinates are not competent and experts in their area of work

The greater the incidence of the factors listed above, the more severe and complicated the burden of supervision. Hence, the number of subordinates a person can manage effectively would be smaller. In a mass-production system most of the above factors would rate low and hence managers could operate effectively with large spans of control. The reverse would be true in a job-order (unit) technology system.

One other factor needs to be mentioned before concluding the discussion on span of control. Many organizations develop staff departments to help in areas like planning, personnel, finance, etc. To the extent that these groups relieve the manager of some of his line responsibilities, his span of control can be increased.

A systematic method for assessing the span of control was developed by the Lockheed Missiles and Space Division and discussed extensively in Child (1977). This is reviewed in Appendix 2.

Process Dimensions of Organization Structure

In order to have the anatomical dimensions of the organization's structure function as intended, several processes need to be in place. These will be discussed briefly below.

Integrative Mechanisms. Many of the choices made in designing the anatomical structure of an organization lead to differentiation within the organization that increases as job specialization increases. The different roles and orientations that are created as a result necessitate the creation of integrative mechanisms, so that the efforts of diverse personnel are coordinated. Several integrative mechanisms are possible, such as:

-- Rules and programs
-- Hierarchical coordination
-- Through plans
-- Through direct contact
-- Through liaison roles within departments
-- Through task forces and teams
-- Through specific integrator roles
-- Through specific integrating departments
-- By evolving to a matrix organization

Factors that influence the choice of particular integrative mechanisms are:

-- The degree of integration required in a particular situation

-- Situational difficulties in effecting particular forms of integration

-- Costs of alternative mechanisms

Rules and programs achieve coordination via standardization of job activities; coordination through plans is achieved by integrating the contributions of different units; and, finally, the more personal forms of integration, such as direct contact and teams, do so by exchange of information directly between concerned people and the mutual adjustment of actions.

Rules and programs are the most economical means of integration, and often used in the traditional bureaucratic form of organization. An elaborate system of rules and procedures is worked out, over time, and formalized. This is appropriate when most of the problems the organization/unit has to cope with are of a recurring type and do not require innovative solutions because this form of integration is also the least flexible. In such a system, when conflicts and exceptions from the norm arise, they are referred up the hierarchy to a point where the concerned departments share a common boss. Integration through rules and programs is thus supplemented with hierarchical coordination. As mentioned before, this system is appropriate when the operating conditions are stable and predictable. A system of coordination that is slightly more flexible than the use of rules and programs is integration through plans and schedules, because these can usually be modified.

As uncertainty increases, however, this system gets overloaded. Many of the decisions to be made become nonrecurring decisions, which are constantly being referred up the hierarchy, creating decision-making delays and overloading upper levels of the organization. Plans are being constantly reviewed and modified.

To cope with higher levels of uncertainty, more flexible and sophisticated mechansims have to be used. These are listed below in increasing level of sophistication (and increasing cost):

1. Direct contact between affected personnel.

2. Create a liaison role by giving special responsibility to a staff member for interacting with departments requiring frequent contact.

3. Set up temporary task forces with members from the various functions and departments affected by a problem.

4. If the problems affecting several functions and departments constantly recur, replace the temporary task force with a permanent group.

5. If the integration between some areas is getting too complex, a special "Coordinator" can be appointed on a full-time basis.

6. The "Coordinator" can be upgraded to a "Coordinating Department."

7. Finally, establish a sophisticated matrix system.

It should be stressed that most organizations do not need to go all the way to #7 for their integration needs. The more sophisticated the integration, the more the organizational costs associated with it, and the amount of integration one needs is directly related to the degree of differentiation one has.

Centralization vs. Delegation

Both "centralization" and "delegation" are strategies for maintaining control in organizations. In a centralized organization, control is exercised by a small group of people at the top. The level of discretionary action on the part of other managers is thus low. Delegation is the process of delegating specific decision-making powers to particular managers at lower levels of the organization. Several arguments can be listed both for an increased amount of centralization, and an increased amount of delegation.

For increased centralization:

-- Easier coordination
-- Consistent policies
-- Managerial economy
-- Proven judgment
-- Tight control
-- Quick decisions in crises

For increased delegation:

-- Relieves burden on senior managers
-- Higher level of motivation and morale at lower levels
-- Aids management development
-- More adaptive and flexible
-- More comprehensive performance-measurement system

The trade-offs between greater centralization and greater delegation obviously need to be made in the light of specific situational needs. Some propositions are:

- The larger the organization, the more difficult are centralized control and decision making.

- The greater the geographic dispersion of organizational units, the greater the need for delegation.

- The more stable and predictable the environment, the greater the possibility of using centralized control.

- The more professionalized the organization, in terms of the number of professionals and the existence of professional norms, the more decentralized it is.

Planning and Control Systems

The control and information system refers to the processes in place for setting plans and monitoring performance through the use of formal information flows. The extent to which a formal and sophisticated information system is used to monitor and control managerial performance has significant implications for managerial behavior and organization design.

First, a formal measurement and evaluation system orients the manager toward the goals he is expected to achieve. By defining performance objectives in a measurable way, they provide an effective basis for performance evaluation and deciding on rewards. Clearly defined objectives also provide constant feedback to the manager to let him know where he stands. They are thus important motivators of performance. However, to serve this end, the performance objectives must be perceived as being fair and attainable. Thus, performance objectives must reflect the environment within which the manager operates. If the environment is unpredictable, the goals must be flexible and reviewed frequently. If the environment is stable, more focused goals are feasible and the reviews can focus on whether the goals are attained rather than whether the goals were appropriate. Three criteria which are commonly suggested for evaluating the effectiveness of a management planning and control system are:

-- the extent to which the system encourages goal congruence between the manager's goals and the organization's goals (Does the system measure the manager on the areas that you want him to focus on? Does it adequately coordinate across departments?)

-- the extent to which the system is fair, in the sense that the manager is evaluated and rewarded on the basis of performance largely within his control (Does it take into account his interdependencies on other units and people outside his department?)

-- the extent to which the system is feasible, in the sense that data on the defined performance indicators are

obtainable at reasonable cost

The second dimension for looking at the system is in terms of its level of sophistication. Organizations with sophisticated information systems employ a relatively larger number of specialists, which has several consequences. It institutes formal procedures and controls, and it increases administrative overheads. It also increases the possibilities of line-staff conflicts. However, it does have the advantage of making more optimum use of resources, technology, etc., particularly where the problem is complex and large amounts of data need to be handled. In general, Khandwala (1977) observes that:

"The more competitive and innovation-rich the environment; the more technologically sophisticated and complex the environment; the larger the organization; and the wider its distribution network, the more sophisticated and comprehensive is the control and information system employed in the organization.

"The more professional the orientation of the top management--that is, the more it stresses both optimization and participation--the more sophisticated and comprehensive is the control and information system employed by the organization."

Top-Management Style

Top-management style is an important variable in the design of organizations. Quite often, it is top management's style and preferences that lead to particular choices about an organization's strategy and structure. Conversely, the effectiveness of particular structural forms is better with particular styles.

Khandwala (1977) lists five dimensions that constitute the style of top management.

1) Risk-taking: whether risk-taking or risk-averse

2) Optimization: whether decisions tend to be judgmental and "seat of the pants," or planning and technocracy dominated

3) Flexibility: whether there are mechanistic and rigid administrative relations with bureaucratic values, or organic and flexible relations, with authority depending on situational expertise

4) Participation: whether the orientation is toward individual decision making or team management

5) Coercion: the extent to which there are authoritarian values and coercion is used to secure compliance

In terms of general propositions relating management style with the contextual variables of the organization:

- A stable environment leads to a risk-averse, rigid, and mechanistic style with formal authority.
- A large organization in a diverse and heterogeneous environment leads to participative management style; if the environment is also turbulent, risk taking is also added.
- A competitive, heterogeneous, turbulent environment leads to flexibility and organic modes with situational expertise and risk taking.
- A complex and heterogeneous environment leads to planning and technocracy-dominated and participative style.
- A simple, unrestrictive, and homogeneous environment leads to nonparticipative and "seat of the pants" management style.

Training, Indoctrination, and Selection

The structure and processes discussed so far are all geared towards coordinating the activities of the diverse groups of people that form part of the organization. By selecting the right people, appropriately training them, and indoctrinating them into the culture of the organization and the behavior patterns expected of them, the operation of the organizational structure and processes is greatly facilitated.

By using the definitions that have been formulated for different organizational roles, the organization can specify what knowledge and skills are required and use these criteria to obtain appropriate people.

However, in most cases of reorganization, it is not possible to acquire entire groups of new people. Training and indoctrination then become more important; the objective is similar, however, to that of selection, namely to ensure that the job holder will be suitably qualified to carry out the role the organization requires of him.

One point that may be mentioned here is that job specialization, control, and training are highly interdependent.

Intensive training to achieve particular behavior patterns is also a means to coordinating the behavior of large groups of people. To the extent that one can predict and rely on the performance of individuals, one can achieve effective organizational performance through a lesser use of formal mechanisms. Table 12 summarizes the relationships between organizational processes and organizational structures.

Table 12

Relationship between Organizational Processes and Organizational Structures

	GROUPING FORM		
	FUNCTIONAL	DIVISIONAL	MATRIX
Job Specialization	High	Moderate	Mixed
Job Formalization	High	Moderate	Moderate
Span of Control	Large	Low-Moderate	Variable
Integrative Mechanisms	Rules & Programs; Hierarchical Coordination; Plans	Plans; Direct Contact; Liaison Roles	Task Forces; Integrator Roles; Dual Reporting
Delegation	Centralized Authority	Decentralized	Variable
Planning and Control Systems	Formal Budgets; Central Monitoring & Coordination	Formal Coordination; Decentralized Monitoring	Flexible, Depending on Specific Project
Top-Management Style	Authoritative, Planning-Dominated	Risk-taking, Flexible	Flexible, Participative
Training and Indoctrination	Specific Skills	Specific Skills; Transferable	Flexible Requirements

V. PROBLEM DIAGNOSIS AND INTERVENTION

Previous sections have outlined the contextual factors, structural dimensions, and organizational processes to be considered in assessing organizations. Problems arise when there are strains between these aspects. In this section, we shall focus on how structure and process factors fit into a framework for assisting organizations to become more effective.

Spencer and Cullen (1978) produce a typology of problems encountered in the OE literature. This is summarized in Table 13. Task problems imply examining the job-specialization domain. Should tasks be functionally specialized, for example? Should there be more or less specialization? On the process side training or selection systems should be examined. Are people trained for their jobs? Have the right people been selected?

Goal Problems imply problems with planning and control systems and possibly management style. Hierarchy or span of control may also be a problem if they hinder communication of mission.

Interdependence Problems involve problems in integration systems and structurally around the grouping of personnel. For instance, in some contexts collaboration will not be possible given a strong functional hierarchy.

Power Problems are centered around centralization or decentralization of decisions as well as around top-management style. Hierarchy and span of control can affect this domain, particularly if the levels of the organization prevent real discussion and participation in problems.

Climate Problems may emanate from a variety of sources. Table 14 from Williamson (1980) details how dimensions of Litwin and Stringer's (1968) Organizational Climate Survey Questionnaire (OCSQ) relates to organizational systems.

Table 13

Client Problems

Beckhard	Blake & Mouton	Bowers	French & Bell	Schmuck & Miles	Problem Categories
structure/role	(norms/standards)	structure		institutional characteristics technical/ structural arrangements role definition	task problems
(communication) planning		(communication) work facilitation		decision making	
management strategy (motivation)	goals & objectives	goal emphasis	goal setting	developing objectives	goal problems
(communication) mergers intergroup collaboration		(communication) interaction facilitation	conflict resolution interface relations	conflict resolution collaboration	interdependence problems
	power/authority		superior/subordinate relations	leadership authority	power problems
organizational climate (motivation)	morale/cohesion	lack of support		culture/climate regenerative interaction	climate problems
cultural norms	(norms/standards)	norm		values guiding interaction	

Parentheses ( ) indicate that the problem can be classified in two categories.

(From Spencer, L. M., and Cullen, B. J. Taxonomies of Organizational Change: Literature Review and Analysis. Boston: McBer and Company, 1978, p. 91.)

Table 14

A GUIDE FOR INTERPRETING SCORES ON THE CLIMATE DIMENSIONS

Climate Dimension	Key Issues and Questions	Aspects of the Organization to Examine
FLEXIBILITY	• Do unnecessary rules and procedures get in the way? • Is it relatively difficult to innovate or to get new ideas accepted? • Do people feel that they have to fight against unreasonable constraints? • Does management place more emphasis on getting the job done or following the rules?	• Policy formulation and implementation procedures • Administrative paperwork systems • Innovation policies and procedures • Problem-solving procedures • Research/development/new ideas systems • Management style: control and accessibility • Others?
RESPONSIBILITY	• Are important tasks delegated to subordinates for accomplishment? • Are individuals encouraged to take initiative without always checking with a superior? • Are individuals encouraged to take calculated risks based upon their best judgments? • Are individuals allowed the opportunity to experience the success or failure of one's own efforts?	• Decision-making policies and procedures • Job design for key responsibilities/ authority • Risk identification and assessment procedures • Control systems • Power and influence patterns • Management style: delegation and participation • Others?

From Williamson, S. A. Organizational Assessment by Climate Survey. Boston: McBer and Company, 1980.

Climate Dimension	Key Issues and Questions	Aspects of the Organization to Examine
STANDARDS	• Does management emphasize good performance and improving performance? • Are challenging and realistic goals set on the job? • Are there opportunities for individual participation in goal setting and planning at appropriate times? • Do individuals receive information and feedback regarding goal accomplishment?	• Strategic planning policies and procedures • Business planning procedures • Operational goal-setting and action-planning procedures • Goal monitoring and control systems • Individual performance standards/ appraisal • Management style: Direction and feedback • Others?
REWARDS	• In general, do rewards seem to outweigh punishments? • Are available rewards tied directly to performance quality? • Does management offer valued recognition of top performers? • Does good performance lead to increased opportunities for individual growth and development?	• Recognition programs • Training and development systems • Career development systems • Selection/promotion and appraisal systems • Meaningful job designs • Management style: Recognition and encouragement • Other?

Climate Dimension	Key Issues and Questions	Aspects of the Organization to Examine
CLARITY	• Do individuals have a clear idea of what is expected from them? • Do individuals feel that work gets done via an orderly and timely process? • Do tasks get accomplished with efficiency and effectiveness? • Are goals, policies, procedures, and lines of authority clearly articulated and understood?	• Organization design and structure • Information and communication systems • Policy formulation and implementation procedures • Jobs designed for role clarity • Technology/work flow designs • Management Style: Communication and organization • Others?
TEAM SPIRIT	• Do individuals cooperate effectively to get job done? • Do conflicts get resolved effectively? • Do various groups coordinate their efforts effectively on tasks? • Do feelings of trust, pride, and organizational loyalty exist in the workplace?	• Conflict resolution practices • Group symbols of identity • Procedures for interdepartmental/ coordination • Policies and procedures for individual/group development • Jobs designed for effective interfaces • Management style: Integration and development • Others?

Child (1977) lists five "warning signs of a structural problem":

1. Overload (for example, top management working excessive hours). This signals need for greater delegation, possibly the establishment of indirect controls, the personal development of subordinates, and possibly increasing levels of management below the chief executive.

2. Integration (for example, conflict between departments). Solutions to this problem may involve reducing management levels, regrouping activities or introducing new coordinating mechanisms.

3. Innovation or failures to innovate (for example, new ideas that failed in development). In a fast-growing business one solution is to house the research personnel in a self-contained unit away from "the everyday operational side of the organization." This frees them to pursue ideas inside and outside the organization. However, in a more stable business it may be necessary to provide integration between the research and operational parts of the organization.

4. Control (for example, employees have no clear definition of responsibility). The classic solution is to provide job descriptions. However, in a fast-changing situation this may be the opposite from what would be effective. In that situation more role flexibility and less standardization may be necessary.

5. Withdrawal from Work (for example, AWOLs, or turnover). Structures which create impersonality or remoteness can contribute to this problem. A structural solution is to provide a regular procedure for reviewing their progress. Problem diagnosis implies that we can measure the problem. Table 15 outlines some measures which may be used to spot problems. Steers (1977) reports several measures of organizational effectiveness. These are reproduced in Table 16.

From a diagnostic viewpoint, where should one start in trying to match problems to structural conditions or organizational processes? As Section III suggests, the first step is in locating the contextual factors affecting the organization. Table 17 outlines a simple set of contextual variables which organizational interventionists can use to classify organizations. Accompanying each type are the typical problems which occur if structural or process issues are not resolved.

Organizations with support missions generally face intergroup coordination problems, particularly support groups in complex environments (for example, maintenance battalion servicing

Table 15

A Partial Listing of Univariate Measures of Organizational Effectiveness

Overall Effectiveness	The degree to which the organization is accomplishing all its major tasks or achieving all it objectives. A general evaluation that takes in as many single criteria as possible and results in a general judgment about the effectiveness of the organization.
Quality	The quality of the primary service or product provided by the organization. This may take many operational forms, primarily determined by the kind of product or service provided by the organization.
Productivity	The quantity of or volume of the major product or service that the organization provides. Can be measured at three levels: individual groups and total organization. This is not a measure of efficiency, no cost/output ratio is computed.
Readiness	An overall judgment concerning the probability that the organization could successfully perform some specified task if asked to do so.
Efficiency	A ratio that reflects a comparison of some aspect of unit performance to the costs incurred for that performance. Examples: dollars per single unit of production, amount of down time, degree to which schedules, standards of performance, or other milestones are met. On occasion, just the total amount of costs (money, material, etc.) a unit has incurred over some period an be used.
Profit or Return	The return on the investment used in running the organization from the owners' point of view. The amount of resources left after all costs and obligations are met, sometimes expressed as a percentage.

TABLE 15 (continued)

Growth	An increase in such things as manpower, plant facilities, assets, sales, profits, market share, and innovations. A comparison of an organization's present state with its own past state.
Utilization of Environment	The extent to which the organization successfully interacts with its environment, acquiring scarce, valued resources necessary to its effective operation. This is viewed in a long-term, optimizing framework and not in a short-term, maximizing framework. For example, the degree to which it acquires a steady supply of manpower and financial resources.
Stability	The maintenance of structure, function, and resources through time, and more particularly through periods of stress.
Turnover or Retention	Frequency or amount of voluntary terminations.
Absenteeism	The frequency of occasions of personnel being absent from the job.
Accidents	Frequency of on-the-job accidents resulting in down time or recovery time.
Morale	A predisposition in organization members to put forth extra effort in achieving organizational goals and objectives. Includes feelings of commitment. Morale is a group phenomenon involving extra effort, goals communality, and feelings of belonging. Groups have some degree of morale, while individuals have some degree of motivation (and satisfaction). By implication, morale is inferred from group phenomena.
Motivation	The strength of the predisposition of an individual to engage in goal-directed action or activity on the job. This is not a feeling of relative contentment with various job outcomes as is satisfaction, but more akin to a feeling of readiness or willingness to work at accomplishing the job's goals.

TABLE 15 (continued)

Satisfaction	The degree of feeling of contentment felt by a person toward his organizational role or job. The degree to which individuals perceive they are equitably rewarded by various aspects of their job situation and the organization to which they belong.
Internalization of Organizational Goals	The acceptance of organizational goals by individuals and units within the organization. Their belief that the organization's goals are right and proper.
Conflict-Cohesion	A bipolar dimension defined at the cohesion end by an organization in which the members like one another, work well together, communicate fully and openly, and coordinate their work efforts. At the other end lies the organization with verbal and physical clashes, poor coordination, and ineffective communication.
Flexibility-Adaptation	The ability of an organization to change its standard operating procedures in response to environmental changes, to resist becoming rigid in response to environmental stimuli.
Evaluations by External Entities	Evaluations of the organization or organizational unit by those individuals and organizations in its environment with which it interacts. Loyalty, to confidence in, and support given the organization by such groups as suppliers, customers, stockholders, enforcement agencies, and the general public.

(From J. P. Campbell, "Research into the Nature of Organizational Effectiveness. An Endangered Species?" Unpublished manuscript. University of Minnesota, 1973. Used by permission of the author.

Table 16

Performance Indicators (or Symptoms) for Problem Diagnosis

A. Behavioral Outcomes

1. AWOL rates/causes?
2. Article 15's/frequency/causes?
3. Re-enlistment rates?
4. Task performance quality? (individuals)

B. Attitudinal Outcomes

1. Morale/climate?
2. Unit spirit, pride, identity?

C. Mission Effectiveness

1. Operational readiness?
2. ARTEP scores?
3. IG scores?
4. Other indicators of mission fulfillment?

D. Operational Efficiency

1. Operating within budget?
2. Productivity measures?
3. Resource availability/utilization?
4. Task scheduling efficiency (timeliness)?
5. Individual overload?

Table 17

Classification of Organizational Problems by Contextual Variables

Mission	Environment	Technology	Common Problems
support	complex	complex	Intergroup/within group coordination and clarity
support	stable	complex	Within group coordination
support	complex	simple	Intergroup coordination/ efficiency
support	stable	simple	Behavioral
line	complex	complex	Within group coordination and clarity
line	stable	complex	Effectiveness
line	complex	simple	Within group coordination/ efficiency
line	stable	simple	Behavioral

groups geographically separate in combat exercise and depending on other units for parts). Line organizations typically face group coordination problems when faced with complex environments (for example, actual combat situations). Both need a heavy emphasis on integrative mechanisms. However, the structural solutions may be different. The support group may require something closer to a matrix. For example, the maintenance battalion may set itself up with project teams to serve particular problems. Alternatively, rather than existing as a separate functional organization to a line organization, they actually become matrixed across that organization. In other words, people working on a particular problem would be working both for their maintenance group and the line organization. This can only be accomplished, though, with well-thought-out integrative mechanisms (for example, someone who manages conflicts between both groups).

A matrix organization, however, in the line organization would be dysfunctional, since the demands require immediate response. Decision making in matrix organizations is diffuse, which creates critical problems when a quick response is desired. In the case of the line organization in a complex environment with complex technology, centralized coordination may be necessary with mixed structure consisting of some specialist groups (for example, nuclear-warhead specialists) and some functional groups.

Organizations with complex environments and simple technologies often face operating efficiency problems. They spend a lot of time trying to deal with the environment at the expense of internal operations. Planning and control systems are critical in this situation. Structurally, job specialization should include some roles which deal specifically with the environment (boundary-spanning activities).

In stable environments with simple technologies the critical problem is motivation and problems typically are diagnosed as behavioral. In this situation, examination of the way activities are structured is critical. This is a prime situation for examining job design. Training and selection are also important, so that people with the right levels of skills are selected and kept; people with overly high skills easily turnover. Since turnover may be fairly high at any rate, a selection and recruitment system suitable to meet demands is necessary.

Line organizations with stable environments and complex technologies have problems with effectiveness unless selection and training ensures a high calibre of technical expertise. Managers may be unable to standardize jobs in certain technologies but effectiveness is also low if jobs are not formalized.

Both support and line organizations facing complex environments and using complex technologies often face problems of clarity ("what am I doing here?"). In this situation top-management style is important. The best leader for this situation is directive and provides strong mission statements.

Therefore, lack of fit between contextual factors and structure and process leads to problems. However, as Spencer and Cullen (1978) point out, most client problems are not stated in structural or process terms. Often they are stated in general terms or in terms of personality clashes or group conflict. A diagnostic method gathers data and moves from the general symptoms to stated problems (best stated as gaps between actual and ideal). Spencer and Cullen (1978) report nine major steps in an organizational intervention:

1. Scouting
2. Entry
3. Data Collection
4. Analysis of Data
5. Data Feedback
6. Action by Client
7. Follow-up Technical Assistance and Support
8. Evaluation
9. Termination

Gathering data about structure and process through interviews or observation is one way of establishing whether strains exist in these areas. The key questions guiding this process reflect the major dimensions reported previously. These are summarized in Table 18. Key strains have been summarized previously.

How people perceive the organization and the key strains they perceive as a result of structures and systems may be established through a questionnaire such as the Work Environment Questionnaire (WEQ) (Dalziel, Klemp, and Cullen, 1978). Table 19 presents a taxonomy of WEQ scales by the structural dimensions and process dimensions which are implied by gaps between actual and ideal on the WEQ. This is based on a content analysis of the scales. It implies that both process and structure should be looked at jointly. One scale may imply strains against several dimensions. Thus, if there were a gap on order and organization at the unit level, we would look at the integration methods in the organization (how groups are coordinated, for example), as well as the grouping of personnel (does a purely functional form limit the unit's ability to get the resources it needs?). We would also look at job specialization (are jobs set up in such a way that it's a problem coordinating activities?) For example, should roles be less specialized to allow a better flow of information? Locating

Table 18

Key Domains to Be Researched
for Structure or Process Intervention

Organizational Context

- What is the mission of the organization?
- What type of external environment does the organization face? Uncertain? Changing? Distant? etc.
- What technologies are utilized? Complex? Simple? Changing?

Organizational Structure

- How are people grouped in the organization? By function? By division? Matrix? Project Teams?
- How are jobs designed? Functions specified? Roles specialized? Jobs standardized? Jobs formalized?
- How many levels and what is the span of control in the organization?

Organizational Process

- What integrative methods are used in the organization?
- Are decisions centralized or decentralized?
- What are the planning and control systems?
- What is top management's style?
- What are the human-resource systems? Training? Introduction? Selection?

Outcomes

- Does the organization meet its mission?
- Does it operate efficiently?
- What are the key strains people face?

Table 19

Taxonomy of Structural and Process Dimensions for WEQ

Organizational Process Dimensions	Structural Dimensions: Grouping of Personnel	Job Specialization	Levels & Span of Control
Integration Method	Order & Organization (Unit) Pressure	Order & Organization (Unit) Pressure	Supervisor Planning/ Organizing Skills
Centralization/ Decentralization	Pressure	Pressure Job Responsibility	
Planning and Control Systems	Order & Organization (Post) Standards Enforcement	Teamwork	Supervisor Planning/ Organizing Skills
Top-Management Style	Standards Enforcement Order & Organization (Post)		Support & Services Equity
Training, Indoctrination, and Selection		-- Personnel Training -- Supervisor Individual Support -- Supervisor Task Facilitation -- Job Enrichment	-- Supervisor Individual Support -- Supervisor Task Facilitation -- Supervisor Planning/ Organizing Skills

the key strain is a critical step in deciding what the structural or process intervention should be. This intervention will not be easy. Effective interventions depend on a variety of competencies and skills outside the scope of this study. However, locating the right match of structure and design, given the context of the organization, is the first step in building strong organizations.

Appendix 1

Analysis for Grouping of Activities

The logic underlying the grouping of activities has been to group people in such a way that it matches the intensity and complexity of communication and information-sharing needs. There are a number of methods of systematically studying this issue. Both Child (1977) and Mendes (1980) provide detailed descriptions of methods derived from systems analysis. These are the key steps:

1. List:

   a) -- Who gives information to whom
      -- Who receives information from whom

   b) Types of information (e.g., documents, orders, memos)

   c) Frequency of communication

   d) Methods of communication (e.g., telephone, meeting, etc.)

   e) Who makes decisions with whom

   f) How they make decisions (e.g., meeting, informal, written order)

   g) For any particular function or person, who in the organization is most crucial for that function or person to accomplish his or her mission.

2. Summarize these data in flow charts.

3. Draw up a matrix of interrelationships--Figure 1 from Child (1977) is an example of one.

4. It makes sense for activities that are required to be together for coordination to be clustered in the organization. This matrix can be used to cluster activities depending on the intensity of communication required. For example, the matrix in Figure 5 suggests that sales installation and engineering specifications should be closely related, by being merged into one department, by sharing quarters with one another, or at least by having a common manager who would ensure coordination.

   If two functions share the same data, then they should not

Figure 5

Linkage Chart for Hypothetical Organization

Activity ↓	1 Market research	2 Order handling	3 *Marketing* programming	4 *Sales* installation	5 Engineering specification	Etc
2 Order handling	3 3 C					
3 Marketing programming	3 4 C + D	1 5 B or C				
4 Sales installation	3 2 C	1, 2 + 3 3 B or C	3 2 C			
5 Engineering specifications	3 1 –	3 1 –	3 1 –	1 + 3 6 A or B		
6 Factory programming						
7 Stock control						
Etc						

Reasons for linkage key:
1. Co-ordination required
2. Sharing of data
3. Transfer of data
4. Economy of effort
5. Use of same equipment
6. Effective control
etc

Required closeness key:
6. Absolutely necessary
5. Especially important
4. Important
3. Ordinary closeness
2. Unimportant
1. Not desirable

Within each box

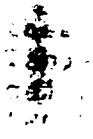
Reasons for Linkage	
Required Closeness	Type of communication

Type of communication key:
A Face-to-face
B Telephone
C Written
D Formal meetings
etc

(From Child, J. Organization. London: Harper & Row, 1977, p. 81.)

be physically separated unless the information is automated and both have equal access to the data base.

In general, these functions, persons, or tasks requiring frequent or intensive communications should be grouped together.



Appendix 2

Analysis for Span of Control

This method was developed by the Lockheed Missiles and Space Division to study problems it felt were arising owing to excessively narrow spans of control, and is described in Child (1977).

Seven factors were identified as most critical for evaluating span of control:

1. Similarity of functions--the degree to which functions, performed by the various components of personnel reporting to a supervisor, are alike or different

2. Geographic contiguity--the degree of physical separation of components of personnel reporting to a supervisor

3. Complexity of functions--the degree of difficulty of nonsupervisory personnel to perform satisfactorily

4. Direction and control--the degree of attention subordinates require for proper supervision of their actions

5. Coordination--the degree to which the supervisors must spend time keeping the organizational relationships between their components and the rest of the organization properly balanced or correlated

6. Planning--the importance, complexity, and time requirements on supervisors for reviewing the objectives, output requirements, and necessary actions to accomplish their unit's mission

7. Organizational assistance--the extent to which the supervisor receives assistance from other supervisors or their assistants.

Figure 6 describes a point chart that can be used to assess these functions. These can be added to form a supervisor index. Table 20 outlines suggested span of control based on an empirical analysis reported in Child (1977) of the relationship between the supervisory index and span of control.

FIGURE 6

Scoring Chart for Supervisor Index

Elements in the supervisory burden of managers and their assessment

Element	Degree of supervisory burden, and points allocated				
Similarity of functions	Identical	Essentially alike	Similar	Inherently different	Fundamentally distinct
	1	2	3	4	5
Geographical contiguity	All together	All in one building	Separate buildings, one plant location	Separate locations, one geographic area	Dispersed geographic areas
	1	2	3	4	5
Complexity of functions	Simple repetitive	Routine	Some complexity	Complex varied	Highly complex, varied
	3	4	6	8	10
Direction and control required	Minimum supervision and training	Limited supervision	Moderate periodic supervision	Frequent continuing supervision	Constant close supervision
	3	6	9	12	15
Co-ordination required	Minimum relationships with others	Relationships limited to defined courses	Moderate relationship easily controlled	Considerable close relationship	Entensive mutual non-recurring relationship
	2	4	6	8	10
Planning required	Minimum scope and complexity	Limited scope and complexity	Moderate scope and complexity	Considerable effort required guided only by broad policies	Extensive effort required; areas and policies not charted
	2	4	6	8	10

(From Child, J. Organization. London: Harper & Row, 1977, p. 62.)

Table 20

Conversion of Supervisory Index into Suggested Spans of Control

Supervisory Index	Suggested Standard Spans of Control
40-42	4-5
37-39	4-6
34-36	4-7
31-33	5-8
28-30	6-9
25-27	7-10
22-24	8-11

(Adapted from Child, J. Organization. London: Harper & Row, 1977.)

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